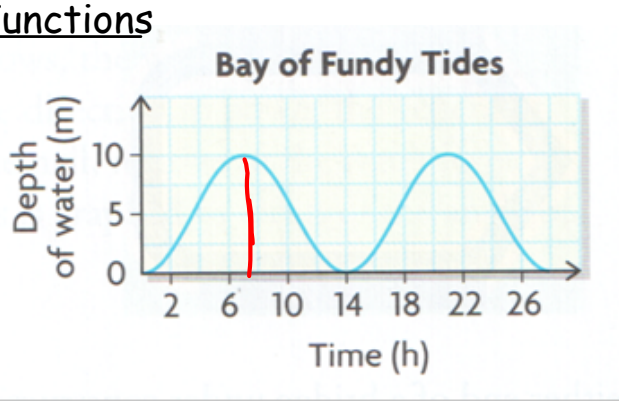
5.3 Graphs of Sinusoidal Functions

Ex 1:



State the following for the function at the right:

a) period 14

b) max value 10

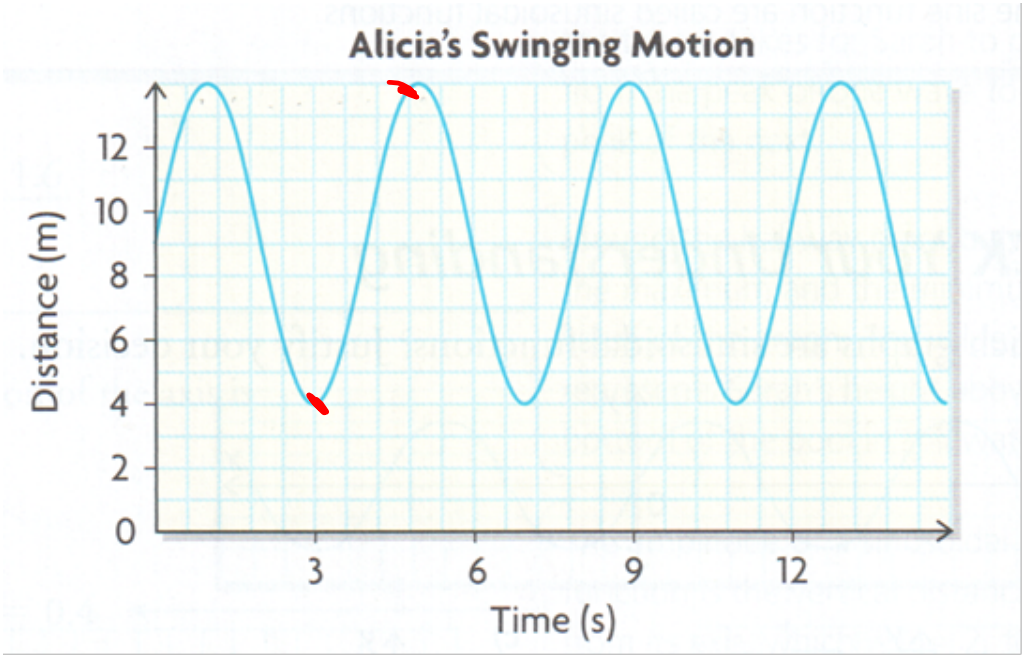
c) min value 0

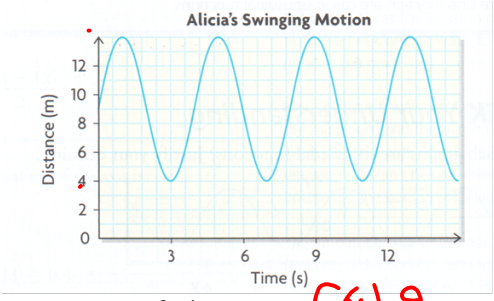
d) equation of the axis f(x) = 5

e) amplitude a= 5

Ex 2:

Alicia was swinging back and forth in front of a motion detector. Her distance from the detector was modeled by the following graph:





- What is the equation of the axis? $f(x)=9$ Counting

Algebraically: $\frac{14+4}{2} = \frac{18}{2} = 9$

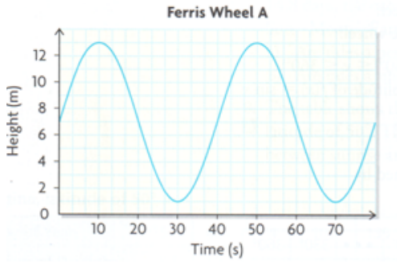
- What is the amplitude? 5 Counting

Algebraically: $\frac{14-4}{2} = 5$

- What is the period of the function 4 sec
- How close did Alicia get to the motion detector? 1
- At t=8 sec would it be safe to run between Alicia and the motion detector?

yes, because it's getting further

Ex 3:



- **What is the period of the function** 40s
- **Maximum** 13m
  Minimum 1m
- **What is the equation of the axis?** $f(x)=7$
- **What is the amplitude?** 6m

1

➡ Recall $C = 2\pi r$ (the radius here is your amplitude) $C=2\pi 6$

- **Determine the circumference of the Ferris Wheel:**

➡ Recall Speed = $\frac{\text{distance}}{\text{time}}$

- **Determine the speed of the Ferris Wheel:**

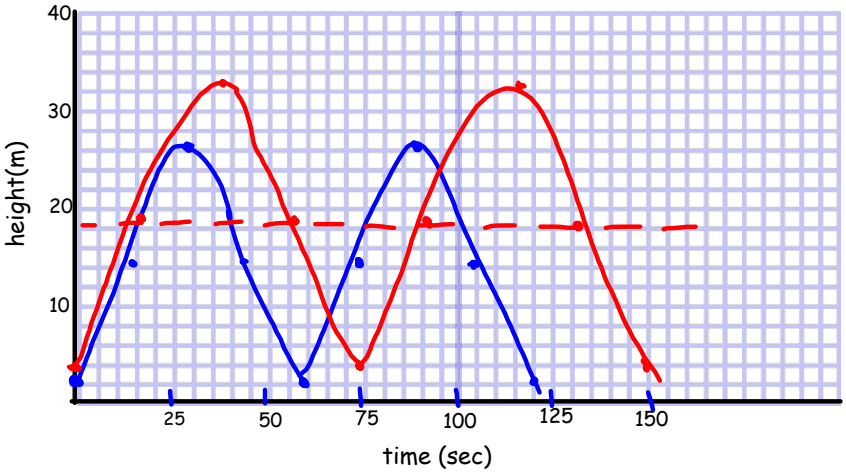
$\frac{2\pi 6}{40}$

Ex 4: Comparing Functions

#1 A Ferris Wheel at Carp Fair has a radius of 12 m and rotates once every 60 sec. At its lowest point, a rider is 2 m above the ground.

#2 The Carp agricultural society is bringing in a new Ferris Wheel that has a radius of 15 m and rotates every 75 sec. On this ride, the highest point a passenger reaches is 33 m.

a) On the same grid, sketch the height of a passenger above the ground for two complete revolutions of both Ferris Wheels



b) Compare the curves:

Property	12m wheel	15m wheel
Period	60sec	75 sec
Amplitide	$\frac{26-2}{2}$ $= 12$ m	$\frac{33-3}{2}$ $= 15$m
Equation of the axis	$\frac{26+2}{2}$ $= 14$	$f(x) = 18$
Range	$\{f(x) \mid 2 \le f(x) \le 26\}$	$\{f(x) \mid 3 \le f(x) \le 33\}$
Speed of the wheel	$C = 2\pi r$ $= 2\pi(12)$ $= 75.3$ $V = \frac{75.3}{60}$ $\doteq 1.25$ m/s	$= \frac{94.25}{75}$ $\doteq 1.26$ m/s

$V = \frac{d}{t}$

Communication:

1. How does changing the radius of the wheel affect the sinusoidal graph?

Changes the amplitude

2. How does changing the height of the axle of the wheel affect the sinusoidal graph?

equation of axis changes

3. How does changing the speed of the wheel affect the sinusoidal graph?

Period changes

Hmwk
p 348
#3 ab, 4, 6-8